PhytoKeys 61: 73–80 (2016)
doi: 10.3897/phytokeys.61.7904
http://phytokeys.pensoft.net

RESEARCH ARTICLE

A peer-reviewed open-access journal
PhytoKeys
Launched to accelerate biodiversity research

Circumscription and synopsis of *Eugenia* section *Speciosae* Bünger & Mazine (Myrtaceae)

Mariana de Oliveira Bünger[1], Fiorella Fernanda Mazine[3], Eve J. Lucas[4], João Renato Stehmann[1]

1 *Laboratório de Sistemática Vegetal, Departamento de Botânica, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, CEP 31270-901, Belo Horizonte, MG, Brazil* **2** *Departamento de Ciências Ambientais, Universidade Federal de São Carlos – campus Sorocaba, João Leme dos Santos, Km 110 - SP-264, CEP 18052-780, Sorocaba, SP, Brazil* **3** *Royal Botanic Gardens, Kew, Richmond, Surrey, TW9 3AE, U.K.*

Corresponding author: *Mariana de Oliveira Bünger* (maribunger@gmail.com)

Academic editor: *P. de Lange* | Received 25 January 2016 | Accepted 4 February 2016 | Published 25 February 2016

Citation: Bünger MO, Mazine FF, Lucas EJ, Stehmann JR (2016) Circumscription and synopsis of *Eugenia* section *Speciosae* Bünger & Mazine (Myrtaceae). PhytoKeys 61: 73–80. doi: 10.3897/phytokeys.61.7904

Abstract

A new section of *Eugenia* (Myrtaceae) is described, segregate from *Eugenia* sect. *Phyllocalyx*. Phylogenetic studies suggest that *Eugenia* sect. *Phyllocalyx* as traditionally delimited is paraphyletic. To maintain the monophyly of each of the sections in *Eugenia s.l.,* we herein opt to circumscribe a new section and recognize six taxa in sect. *Speciosae*, which has a distribution mostly in southeastern Brazil and northern South America. Nomenclatural notes are made and a taxonomic key is provided for the species of the section.

Keywords

Amazon Forest, Atlantic Forest, Neotropics, Myrteae

Introduction

Eugenia Linnaeus is a widespread tropical genus with about 385 species in Brazil (Govaerts et al. 2014, Sobral et al. 2015), most of which grow along the Brazilian Atlantic rainforest biome (Oliveira-Filho and Fontes 2000). *Eugenia* is unique among Myrtaceae in having a native distribution that spans nearly the entire geographic range of the family (Snow 2011).

Copyright *Mariana de Oliveira Bünger et al.* This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

The genus *Phyllocalyx* was segregated from *Eugenia* by Otto Berg (1856) being characterized especially by peduncles with leaf-like bracts and showy sepals, proportionally larger than the flowers. The name *Phyllocalyx* O. Berg (1856) is also illegitimate, being a later homonym of *Phyllocalyx* A. Rich. (1847). When Niedenzu, in 1893, transfered *Phyllocalyx* O. Berg to *Eugenia*, he named it *Eugenia* sect. *Phyllocalyx.* This name is treated as *nomen novum* and has the same type as the illegitimate name. It has priority from 1893 and must be cited as *Eugenia* sect. *Phyllocalyx* Nied., not as *Eugenia* sect. *Phyllocalyx* (O. Berg) Nied. (McNeill et al. 2012 – Article 58.1).

Recently, based on a molecular (nuclear and plastid markers) phylogenetic analysis, Mazine et al. (2014) recognized nine clades in *Eugenia* s. l. They also confirmed the inclusion of *Calycorectes*, *Hexachlamys*, and *Phyllocalyx* in *Eugenia.* The "Phyllocalyx clade" or "clade 6" sensu Mazine et al. (2014) refers to *Eugenia* sect. *Phyllocalyx* Nied. comprising c. 15 species widely distributed in the Atlantic Forest, from eastern Brazil to Paraguay. The section is characterized by peduncles with leaf-like bracts and showy sepals, proportionally larger than the flowers (Berg 1856, under *Phyllocalyx*), and is currently being monographed (Bünger et al. unpubl. res.). A remarkable result of Mazine et al. (2014) is the placement of *Eugenia wentii* – traditionally included in *Eugenia* sect. *Phyllocalyx* (Mc Vaugh 1969) – in "clade 9" althoug this clade does not have any support.

After broad sampling of *Eugenia* sect. *Phyllocalyx* within a molecular framework (using five markers, one nuclear and four plastid) (Bünger et al. unpubl. res.), results show that *Eugenia* sect. *Phyllocalyx* sensu Berg emerges as a paraphyletic group. The clade containing most species previously placed in section *Phyllocalyx* and also containing the type-species of the section (*Eugenia involucrata* DC.) emerges as a well-supported monophyletic group (PP Bayes: 0.99; PP Beast: 0.97; ML: 75). A second, also well-supported clade (PP Bayes: 1; PP Beast: 1; ML: 100) includes species previously included in *Eugenia* sect. *Phyllocalyx* (*Eugenia bunchosiifolia* Nied., *E. hermesiana* Mattos, *E. longipetiolata* Mattos, *E. macedoi* Mattos, *E. speciosa* Cambess and *E. wentii* Amshoff) but emerges with high support (PP Bayes: 0.99; PP Beast: 0.99; ML: 72) as sister to clade 9 *sensu* Mazine et al. (2014). Now, the clade 9 also emerges with high support (PP Bayes: 0.99; PP Beast: 0.99; ML: 86).

Bünger et al. (unpubl. res.) also have optimised morphological characters across the molecular tree, presenting useful results with which to distinguish the sections. Results indicated that these characters are uncommon in *Eugenia s.l.* and can therefore be used to support placement of species inside a genus/subgenus/section (e.g. Berg 1857, Niedenzu 1893, McVaugh 1969, Mattos 1989). Although these two clades do not emerge in a monophyletic group, they share the floral characters of showy sepals and bracteoles that could be homoplastic characters in *Eugenia s.l.*

To avoid continued recognition of a paraphyletic taxon we herein recognize a new section called *Eugenia* sect. *Speciosae* and provide the new circumscription of *Eugenia* sect. *Speciosae*, an identification key and a synopsis of the known species of this new section.

Taxonomic synopsis

The section name "*Speciosae*" was chosen based on the fact that *Eugenia speciosa* is the most geographically widespread species in this group. The specific epithet "*speciosa*" is also the oldest within the section (Cambessédes 1832)

***Eugenia* sect. *Speciosae* Bünger & Mazine, sect. nov.**
urn:lsid:ipni.org:names:77153396-1

Notes. Trees or shrubs; hairs simple. Indeterminate inflorescence which produces a floral region that, for instance, produces monads, dyads or triads and vegetative innovative shoots, as an auxotelic inflorescence (Briggs and Johnson 1989); bracteoles linear or narrowly elliptic persistent at anthesis but caducous in mature fruits; flowers showy always 4–merous; sepals showy, free, foliaceous, sepals and petals concealing the apex of the bud; ovary 2–locular; ovules 2–many, placenta axile. Fruit crowned by the calyx lobes. Seeds 1–2; seed coat membranous or cartilaginous; embryo with fused cotyledons.

Type. *Eugenia speciosa* Cambess. Fl. Bras. Merid. 2 (19): 351. 1832.

Eugenia sect. *Speciosae* contains six species with three occurring in the Atlantic Forest of Brazil, and one distributed in northern South America, in the Amazon. The Atlantic Forest-Amazon disjunction distribution represents a classic biogeographic pattern of the Southern Hemisphere (McVaugh 1968).

1. *Eugenia bunchosiifolia* Nied., Nat. Pflanzenfam. 3, Abt. 7: 82. 1893.

Basionym: *Phyllocalyx grandifolius* O. Berg, Fl. Bras. 14(1): 333. 1857.
Type: Brazil. *Habitat ad urbem Santos in prov. S.Pauli, fructificat Majo:* Sellow s.n. (holotype: B, destroyed; lectotype here designated: K[000170006]!)
Phyllocalyx grandifolius var. *pyriformis* O. Berg, Fl. Bras. 14(1): 591. 1859.
Type: Brazil. *Habitat in silvis prope urbem Rio de Janeiro, e.g. ad Tejuca, florebat Novembri, fructificabat Septembri:* Riedel s.n. (holotype: LE! [photo])
Eugenia santensis Kiaerskou, Enum. Myrt. Bras. 163. 1893, nom. superfl.
Type: Based on *Phyllocalyx grandifolius* O. Berg
Eugenia littoralis Mattos, Loefgrenia 42:1. 1970, nom. illeg.
Type: Brazil. São Paulo: Peruibe, Prainha, 25 Jul 1969, Mattos 15599 (holotype: HB!)
Eugenia brunoi Mattos, Loefgrenia 99:2. 1990, syn. nov.
Type: Based on *Eugenia littoralis* Mattos

Notes. *Eugenia bunchosiifolia* is a tree 3–15m alt. from the coastal Atlantic Forest of Brazil, growing in rainforests from Paraná, Rio de Janeiro and São Paulo states. This

species has glabrous leaves with obscure glandular dots visible on both faces, leaf apices are acuminate, without cartilaginous margins, the hypanthium is velutinous. The lectotype of *Eugenia bunchosiifolia* was chosen because the holotype was destroyed in the Second World War. The specimem found at K was a isotype and now considered the lectotype of this name.

The protologue and the examinated holotype of *Eugenia brunoi* matches with those of *E. bunchosiifolia*, hence this species is here synonymized with *E. bunchosiifolia*

2. *Eugenia hermesiana* Mattos, Loefgrenia 94: 1. 1989

Type. Brazil. São Paulo: Salesópolis, na Estação Biológica de Boracéia, 15 Jan. 1968, *Rabello, E. s/n.* (holotype: HAS, not found).

Notes. This species has glabrous leaves without cartilaginous margins, dots visible mostly abaxially, leaf apices are acute or obtuse, the hypanthium is velutinous. *Eugenia hermesiana* is a shrub up to 3 m high from São Paulo State (Brazil), growing in the coastal Atlantic Forest. There are few specimens located in BHCB, IAC, NY, SP and SPSF. It is a threatened species classified as Endangered in the Brazilian Official List of Flora Threatened Species (MMA 2014).

3. *Eugenia longipetiolata* Mattos, Dusenia 8: 162. 1968.

Fig. 1D

Basionym: *Stenocalyx mutabilis* O. Berg, Fl. Bras. 14(1): 347. 1857.
Type: Brazil. *Tingua*, Schott 5854 (lectotype here designated M [M-0170971]!; isolectotype W! [photo])
Eugenia mutabilis Nied., Nat. Pflanzenfam. 3, Abt. 7: 81. 1893, nom. illeg.
Type: Based on *Stenocalyx mutabilis* O. Berg
Eugenia tinguana Mattos, Loefgrenia 123: 1. 2006, nom. superfl.
Type: Based on *Stenocalyx mutabilis* O. Berg

Notes. *Eugenia longipetiolata* is a tree up to 15 m high from coastal Atlantic Forest of Brazil, growing in ombrophilous forests from Rio de Janeiro and São Paulo states. This species has leaves with visible, flat gland dots on both faces, black-floccose simple trichomes on abaxial faces, caudate apices, non-cartilaginous margins and a ferruginous-pubescent hypanthium.

The lectotype was chosen for *Stenocalyx mutabilis* because Berg did not indicate a single specimen and Mattos did not designate a ectotype when he published the nom. nov.. The specimen from M was seen and here considered the lectotype for the name.

Figure 1. A, B Auxotelic inflorescence and foliaceous calyx, *Eugenia wentii* (photo by B. Holst) **C, E, F** *Eugenia speciosa*, mature fruit with decidous bracteoles, stem bark and position and format of the bracteoles (photos by M.O.Bünger); D *Eugenia longipetiolata* (photo by M.O.Bünger).

4. *Eugenia macedoi* Mattos & D. Legrand, Loefgrenia 67: 24. 1975.

Type. Brasil, Minas Gerais: Ituiutaba, San Vicente, 12 Sep. 1950, *Macedo, A. 2574* (holotype: MVM, not seen; isotype US! [00603977])

Notes. *Eugenia macedoi* is known only by two specimens colected in Minas Gerais and Goiás States (Brazil). This species is a shrub growing in the Cerrado biome (like *savannas*). Apparently it is the only species of the section that occurs in dry areas. This species has glabrescent leaves without cartilaginous margins, dots visible on both faces, leaf apices are acute, and the hypanthium is velutinous.

5. *Eugenia speciosa* Cambess., Fl. Bras. Merid. (quarto ed.) 2(19): 351. 1832.
Fig. 1C, E, F

Phyllocalyx speciosus (Cambess.) O. Berg, Fl. Bras. 27(2–3): 307. 1856.

Type: Based on *Eugenia speciosa* Cambess.

Phyllocalyx retusus O. Berg, Fl. Bras. 14(1): 331. 1857.
Type: Brazil. *Habitat ad ripas flaminis Rio Pardo in Montevideo:* Sellow s.n. (holotype B, probably destroyed; isotypes: K! [000276590], BR! [0000005261277]).
Phyllocalyx limbatus O. Berg, Fl. Bras. 14(1): 332. 1857.
Type: Brazil. *Habitat ad Angra dos Reys in prov. Rio de Janeiro: Pohl 264, 5760., loco incerto ajusdem prov., Sellow* s.n. (lectotype here designated BR! [526061-Sellow]!; isolectotype: B (fl.), probably destroyed; W (fr.) [photo]!).
Phyllocalyx macrosepalus O. Berg, Fl. Bras. 14(1): 332. 1857.
Type: Brazil. *Habitat ad Alegres et Manoel Jesu praedia in prov. Minarum:* Mikan s.n., Pohl s.n. (lectotype here designated: BR! [526984]; isolectotypes: M! [M-0171010], W [photo]!).
Phyllocalyx marginatus O. Berg, Fl. Bras. 14(1): 332. 1857.
Type: Brazil. *Habitat in prov. Rio de Janeiro:* Martius s.n. (holotype: BR! [526094].
Eugenia retusa (O.Berg) Nied., Nat. Pflanzenfam. 7: 82. 1893.
Type: Based on *Phyllocalyx retusus* O. Berg
Eugenia caldensis Kiaerskou, Enum. Myrt. Bras. 162. 1893.
Type: Based on *Phyllocalyx marginatus* O. Berg
Eugenia macrocalyx Mart. ex B.D.Jacks, Index Kew. 1: 908. 1893.
Type: Based on *Phyllocalyx macrosepalus* Berg

Type. Brazil. *In sabulosis prope praedium vulgo Fazenda d'Araucaria in prov. S.Pauli, floret Octobri:* Saint-Hilaire s.n. (lectotype: P [P01902768]!; isolectotype: MPU! [photo])

Notes. *Eugenia speciosa* is a tree 5–12 m high from Atlantic Forest in southern and southeastern Brazil. It is common in rainforests and "restingas". This species also occurs in montane Atlantic Forest in Minas Gerais State (Brazil) and also occurs in Paraguay, Argentina, Uruguay and Bolivia. This species has leaves with visible, salient dots on both faces, glabrous, obtuse apices with cartilaginous margins and a glabrous hypanthium.

The lectotypes chosen for *Phyllocalyx limbatus* and *Phyllocalyx macrosepalus* are from BR; they were seen and we consider that the specimens that well represent the names. The lectotype that was chosen for *Phyllocalyx limbatus* is a specimen that is a duplicate (isotype) of the specimen that was in B which was destroyed in the Second World War. For thus, we consider it as the lectotype for this species.

6. *Eugenia wentii* Amshoff, Recueil Trav. Bot. Néerl. 39: 160, f. 4. 1942.

Fig. 1A, B

Phyllocalyx wentii Amshoff, Recueil Trav. Bot. Néerl. 39: 158, f. 4. 1942
Type: Based on *Eugenia wentii* Amshoff nomen alternativ.
Calycorectes macrocalyx Rusby, Mem. New York Bot. Gard. 7: 313. 1927.
Type: Bolivia. Bopi River Valley. Rusby 666 (holotype: NY! [00386736]; isotypes: BKL! [photo], MICH! [photo], US! [photo])
Eugenia macrocalyx (Rusby) McVaugh, Fieldiana, Bot. 29(3): 212. 1956, nom. illeg.
Type: Based on *Calycorectes macrocalyx* Rusby

Type. Suriname. Fluv. Coppename inf., Went FAFC 142 (holotype: U! [0005034])

Notes. *Eugenia wentii* is a treelet or tree 3–6 m high from the Amazon forest; it is found in Amazônia and Pará States (Brazil), French Guyana, Suriname, Venezuela, Bolivia, Colombia, Ecuador and Peru. This species has glabrous leaves with flat, visible gland dots on both faces, caudate apices without cartilaginous margins and a velutinous hypanthium.

Key to species of *Eugenia* sect. *Speciosae*

1	Hypanthium glabrous	***E. speciosa***
–	Hypanthium with trichomes	
2	Leaves with caudate apices and black-floccose indument on mature leaves	***E. longipetiolata***
–	Leaves with acuminate apices, acute, obtuse or rostrate; glabrous or without black-floccose hairs	
3	Leaves usually with cartilaginous margins	***E. bunchosiifolia***
–	Leaves always without cartilaginous margins	
4	Leaves with acuminate or rostrate apices	***E. wentii***
–	Leaves with acute or obtuse apices	
5	Calyx lobes acuminate 50 to 70 mm long.	***E. hermesiana***
–	Calyx lobes acute 3.9 to 7 mm long.	***E. macedoi***

Acknowledgements

We thank all curators of the visited herbaria for allow us to study the specimens and to Coordenacão de Aperfeicoamento de Pessoal de Nível Superior (CAPES) and Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for the financial support received by the first and the last authors.

References

Berg O (1856) Revisio Myrtacearum Americae. Linnaea 27: 1–472.

Berg O (1857–1859) Myrtaceae. In: von Martius CFP (Ed.) Flora Brasiliensis 14: 1–655.

Briggs BG, Johnson LAS (1979) Evolution in the Myrtaceae–evidence from inflorescence structure. Proc. Lin. Soc. N. S. W. 102: 157–256.

Cambessédes (1832) Flora Brasiliae Meridionalis (quarto ed.) 2(19): 351. 1829

Govaerts R, Sobral M, Ashton P et al. (2014) World checklist of Myrtaceae. Royal Botanic Gardens, Kew. http://apps.kew.org/wcsp/ [accessed: 05.04.2015]

Holst BK, Landrum L, Grifo F (2003) Myrtaceae. In: Berry PE, Yatskievych K, Holst B (Eds) Flora of the Venezuelan Guayana. Missouri Botanical Garden Press, St. Louis, 7: 1–99.

Kiaerskou H (1893) Enumeratio Myrtacearum brasiliensium. In: Warming E (Ed.) Symbolarum ad Floram Brasiliae Centralis Cognoscendam 39: 1–200.

Mattos JR (1989) Novidades taxonômicas em Myrtaceae. Loefgrenia 94: 1.

Mazine FF et al. (2014) A preliminary phylogenetic analysis of *Eugenia* (Myrtaceae: Myrteae), with a focus on Neotropical species. Kew Bulletin 69: 9497. doi: 10.1007/s12225-014-9497-x

McNeill J et al. (2012) International code of nomenclature for algae, fungi, and plants (Melbourne Code). Adopted by the Eighteenth International Botanical Congress Melbourne, Australia, July 2011.

McVaugh R (1968) The genera of American Myrtaceae – an interim report. Taxon 17: 354–418. doi: 10.2307/1217393

McVaugh R (1969) Flora of the Guayana Highland – Myrtaceae. Memoirs of the New York Botanical Garden 18: 55–286.

MMA (Ministério do Meio Ambiente) (2014) Atualização da lista das espécies ameaçadas. Brasília, Brazil.

Niedenzu F (1893) Myrtaceae. In: Prantl K, Engler A (Eds) Nat. Pflanzenfam. 3: 57–105.

Oliveira-Filho AT, Fontes MAL (2000) Patterns of floristic differentiation among Atlantic forests in SE Brazil and the influence of climate. Biotropica 32: 793–810. doi: 10.1111/j.1744-7429.2000.tb00619.x

Snow N (2011) Studies of Malagasy *Eugenia* (Myrtaceae) — II: Four New Species, Including One Eaten by Black Lemurs on Nosy Be. Systematic Botany 36: 677–689. doi: 10.1600/036364411X583646

Sobral M (2003) A família Myrtaceae no Rio Grande do Sul. UNISINOS, São Leopoldo, RS, Brasil.

Sobral M, Proença C, Costa Souza M, Mazine-Capelo F, Lucas EJ (2015) Myrtaceae in Catálogo de Plantas e Fungos do Brazil, v. 2. In: Forzza RC et al. (Eds) Jardim Botânico do Rio de Janeiro.